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Type: Oral Presentation

## Carbon in Modern Nuclear Reactors

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### Abstract content <br> &nbsp; (Max 300 words)

The image of the nuclear power industry is tarnished mainly because of two factors, the release of nuclear waste from accidents such as Chernobyl and Fukushima, and fears around suitable and safe long-term storage of nuclear waste. The talk will deal with some steps taken by the industry to address these two points and how carbon can play a central role in both these aspects.

Many of the next generation (i.e. Generation IV) nuclear power plants will use coated fuel particles to contain the radioactive fission products within the fuel particles and thereby prevent release of radioactivity during accidents. In the TRISO fuel particle the coatings consist of layers of pyrolytic carbon and SiC. The functions of the different pyrolytic carbon layers will be discussed. Examples of analyses done on these layers and their relevant properties in our laboratory will be shown and discussed.

Glassy carbon is a possible containment material for long-term storage of high level radioactive waste. Reasons why glassy carbon is a suitable material for such a purpose will be given. Two important properties of a containment material are low diffusivity for nuclides and radiation resistance.

Since radiation damage can enhance or induce diffusion, a review will be given of radiation damage in graphitic and in glassy carbons. In our studies we used Raman spectroscopy to determine the effect of radiation damage on glassy carbon at different bombardment and annealing temperatures.

The diffusion of implanted radiological important elements in glassy carbon has been investigated using RBS. Examples will be given of some of our investigations. Chemical interaction between the implanted species and the glassy carbon is investigated using SEM.

### Apply to be<br> considered for a student <br> &nbsp; award (Yes / No)?

No

### Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

Yes

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